

REMARKS

Claims 1 to 4, as amended, appear in this application for the Examiner's review and consideration. Claim 5 was canceled without prejudice by a previous Amendment. The amendments to the claims are fully supported by the specification and claims as originally filed. Therefore, there is no issue of new matter.

Claims 1 to 4 stand rejected under 35 U.S.C. § 103(a), as allegedly being unpatentable over Japanese Application Publication No. JP 2003-313628 (JP '628) for the reasons set forth on pages 2 to 6 of the Final Office Action.

In response, Applicants submit that the presently claimed invention is directed to a high-strength thick steel plate excellent in low temperature toughness at heat affected zone resulting from large heat input welding of more than 20kJ/mm. The high strength steel plate has a thickness of at least 50 mm, and consists of, by wt%, C: 0.03-0.14%, Si: 0.30% or less, Mn: 0.8-2.0%, P: 0.02% or less, S: 0.005% or less, Al: 0.012 - 0.040%, N: 0.0010-0.0100%, Ni: 0.8-4.0%, Ti: 0.005-0.030%, Nb: 0.003-0.010%, optionally, at least one of Mg: 0.0003-0.0050%, and REM: 0.001-0.030%, and at least 100/mm² of oxide particles containing O: 0.0010-0.0050%, and having an equivalent circle diameter of 0.005 to 0.5 μm, optionally at least one of: B: 0.0005-0.0050%, Cr: 0.1-0.5%, Mo: 0.01-0.5%, V: 0.005-0.10%, and Cu: 0.1-1.0%, and a balance of iron and unavoidable impurities. Ni and Mn satisfy equation [1]:

$$\text{Ni/Mn} \geq 10 \times \text{Ce}_{\text{eq}} - 3 \quad (0.36 \leq \text{Ce}_{\text{eq}} \leq 0.42) \quad [1],$$

where, $\text{Ce}_{\text{eq}} = \text{C} + \text{Mn}/6 + (\text{Cr} + \text{Mo} + \text{V})/5 + (\text{Ni} + \text{Cu})/15$.

As the claims have been amended to change the transitional phrase from "consisting essentially of" to --consisting of--, the claims exclude any element or ingredient that is not recited in the claims. Other than unavoidable impurities, the composition of the presently claimed steel plate is limited to the components recited in the claims in the recited amounts. Thus, the claims have been amended to exclude calcium, Ca, from presently claimed steel plate. Prior art disclosures of steel products containing Ca are outside the scope of the present claims.

In contrast to the presently claimed steel plate, JP '628 discloses a steel product, having toughness in a weld heat-affected zone, and containing:

C: 0.03 to 0.18 percent,

Si: ≤ 0.50 percent,

Mn: 0.40 to 2.0 percent,

P: \leq 0.02 percent,
S: \leq 0.02 percent,
Ni: 0.6 to 4.0 percent,
Nb: 0.005 to 0.10 percent,
Al: 0.005 to 0.070 percent,
Ti: 0.005 to 0.030 percent,
Ca: 0.0005 to 0.0050 percent,
N: 0.0005 to 0.0070 percent,
B: 0.0005 to 0.0030 percent, and
a balance of Fe and unavoidable impurities.

The steel further has a value, ENI, which satisfies $ENI \geq 0$ in a chemical equivalent expression:

$$ENI = Ni \text{ percent} - 18 C \text{ percent} - 36 Nb \text{ percent} + 1,$$

and a value, EN, which satisfies $-0.004 \leq EN \leq -0.0005$ in the chemical equivalent expression:

$$EN = N \text{ percent} - 0.292 Ti \text{ percent} - 1.292 B \text{ percent}.$$

In addition, the disclosed steel has 100 to 3000 pieces/mm² of particles, which have a circle-equivalent particle size of 0.005 to 2.0 μm , containing at least Ca, Al, and O, as well as 3 percent or more Ca, 1 percent or more Al, on average mass percent of elements except O, and the balance the other deoxidized elements and/or unavoidable impurities.

Therefore, Ca is a necessary element of the steel product disclosed by JP '628. JP '628 discloses that the Ca must be present in the disclosed steel plate in an amount of from 0.0005 to 0.0050 percent by weight. Accordingly, one of ordinary skill in the art will understand that the Ca present in the steel disclosed by JP '628 is not an unavoidable impurity. As JP '628 discloses a steel containing Ca as a necessary element, and not an unavoidable impurity, JP '638 does not disclose or suggest the presently claimed steel plate, and fails to provide any reason for one of ordinary skill in the art to make and/or use the presently claimed steel plate.

Therefore, as JP '628 fails to provide any reason for one of ordinary skill in the art to make and/or use the presently claimed steel plate, the present claims are not obvious over that reference. Accordingly, it is respectfully requested that the Examiner withdraw the rejection of claims 1 to 4 over JP '628.

Applicants thus submit that the entire application is now in condition for allowance, an early notice of which would be appreciated. Should the Examiner not agree with

Applicants' position, a personal or telephonic interview is respectfully requested to discuss any remaining issues prior to the issuance of a further Office Action, and to expedite the allowance of the application.

No fee is believed to be due for the filing of this Amendment. Should any fees be due, however, please charge such fees to Deposit Account No. 11-0600.

Respectfully submitted,

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